IT is the intention of the authorities at the South Kensington Aquarium to endeavour to introduce herrings into the collection of fish now on view there. The difficulty of naturalising this species to artificial existence is very great, as has been proved by former experiments. At sea-port aquaria, however, where a continuity of salt water may be obtained, this difficulty is obviated to a great extent, but at inland aquaria, where the water is seldom changed, it necessitates extraordinary skill to keep them alive.

AT a meeting of the Council of the National Fish Culture Association, held last week, it was stated that the American Government had forwarded another consignment of Salmonidæ ova since the previous week, and the hatchery was now replete with eggs. It was further stated that the hatchery had been reconstructed and enlarged to meet the strain placed upon its accommodative capacity, so that the Association was in a position to incubate any number of ova.

A LARGE supply of salmon and trout ova has been despatched to New Zealand by Sir Francis Dillon Bell, who is most desirous of stocking the waters of that country with Salmonidæ. The ova were obtained by the Tay District Fishery Board, and deposited in the Howietown establishment until ready for shipment. Much is being done to advance the New Zealand fisheries, and the attempts made in this direction have terminated successfully in nearly every instance.

THE additions to the Zoological Society's Gardens during the past week include a Pennant's Broadtail (*Platycercus pennanti*) from New South Wales, presented by Mr. H. Stacy Marks, R.A., F.Z.S. ; five Adorned Ceratophrys (*Ceratophrys ornata*) from Buenos Ayres, presented by Dr. F. C. Strutt ; a Common Chameleon (*Chamæleon vulgaris*) from North Africa, presented by Mr. Charles Kershaw ; a Common Gull (*Larus canus*), a Black-headed Gull (*Larus ridibundus*), a Kittawake (*Rissa tridactyla*), British, purchased.

OUR ASTRONOMICAL COLUMN

NAVAL OBSERVATORY, WASHINGTON.—The following novelties occur in the programme of work to be pursued during the year 1886 at the Naval Observatory, Washington, recently published :—

"With the great equatorial it is proposed to make observations of some of the fainter stars in the Pleiades to connect them with the bright ones recently measured with the Yale College heliometer. With the 9·6-inch equatorial observations of variable stars will be commenced. A photometer for this instrument has been ordered from Alvan Clark and Sons ; a spectroscope by Hilger is ready for attachment."

THE SECULAR NUTATION OF THE EARTH'S AXIS.—M. Folie, having deduced a periodic formula for the secular variations in obliquity and in longitude, applies the designation secular nutation of the earth's axis to these variations. Defining the *normal* equator as a plane the inclination of which to the ecliptic of a certain epoch is equal to the mean obliquity of that epoch, and the intersection of which with this latter plane passes at each instant through the mean equinox of that instant, he concludes that, in virtue of the secular nutation of the earth's axis, the mean pole describes round the normal pole, considered as fixed, an ellipse the major axis of which, directed towards the pole of the fixed ecliptic (*i.e.* the mean ecliptic of the epoch) is *sensibly constant during several centuries. The period of the* secular nutation is about 30,000 years, differing little from that of the precession on account of the slow motion of the node of the ecliptic, which is only 8″·7 per annum. Assuming a uniform value of 50″ for the secular diminution of the obliquity, M. Folie compares the results obtained from his formula with ancient observations of the obliquity, and is thus led to announce that the empirical expression $\epsilon_1 = -0''{\cdot}476 + 0''{\cdot}000018t$ for the annual diminution (where t is the number of years from 1850) satisfies very closely the observations from − 250 to + 1487. This expression, however, gives a considerably greater variation to the secular diminution of the obliquity than that which results from Leverrier's researches.

ASTROPHYSICAL OBSERVATORY OF POTSDAM.—The first part of the fourth volume of the publications of this Observatory, which was published in the latter part of last year, contains three papers. The first of these is by Prof. Vogel, and contains the observations which he made with the great Vienna refractor in 1883 for the purpose of testing the performance of the great object-glass. Prof. Vogel's final verdict is altogether favourable : "The Vienna objective," he says, "leaves nothing to be desired as regards the precision of the images ;" and he speaks of using with advantage a power even of 1500 upon planetary markings, a statement which is illustrated by a sketch of part of Saturn's ring, as seen with that magnifying power. His principal observations were, however, spectroscopic, Prof. Vogel utilising the great light-gathering power of the Vienna equatorial for a detailed examination of the remarkable spectra shown by several faint stars, classified by him under types II.*b* and III.*b* ; the former including spectra showing both dark and bright lines, and the latter, spectra crossed by dark bands, for the most part sharp towards the red and shaded towards the violet. The bright lines in the former class, with the exception of the green line of hydrogen, have not been identified with those of any element. The principal bands of the latter class Prof. Vogel refers, as Dr. Dunér does, to the absorption exercised by hydrocarbons in the atmosphere of the star. The paper also contains a number of observations of nebulæ, principally planetary, and is illustrated by four lithographic plates.

The second paper contains meteorological observations made in the years 1881 to 1883, and the third is a very careful investigation by Dr. G. Müller of the influence of temperature on the refraction of light through prisms, of various kinds of glass, of Iceland-spar and rock-crystal.

COMETS FABRY AND BARNARD.—The brightness of these two comets continues to increase, Fabry's comet in particular promising ere long to be visible to the naked eye ; and it seems probable that at the end of April and the beginning of May we may see the unusual spectacle of two bright comets near each other, and very nearly in the zenith.

The following ephemerides are given for Berlin midnight, that for Fabry's comet being by Dr. H. Oppenheim, and that for Barnard's by Dr. A. Krueger :—

Fabry's Comet

1886	R.A. h. m. s.	Decl. ° ′	Log. r	Log. Δ	Brightness
Feb. 19	23 21 32	27 13·7 N.	0·0370	0·2058	4·1
23	23 21 0	28 10·6	0·0121	0·1958	4·8
27	23 20 27	29 11·0	9·9860	0·1836	5·7
Mar. 3	23 19 49	30 14·8 N.	9·9591	0·1639	6·9

Barnard's Comet

Feb. 18	2 1 42	18 20·1 N.	0·2017	0·2412	2·9
22	1 59 29	19 20·7	0·1836	0·2426	3·1
26	1 57 39	20 23·4	0·1646	0·2432	3·4
Mar. 2	1 56 8	21 28·4 N.	0·1443	0·2429	3·7

STELLAR PHOTOGRAPHY.—The new nebula around Maia, discovered by means of the photographs taken at the Paris Observatory, has since been seen with the great Pulkova refractor.

M. Cruls, Director of the Rio de Janeiro Observatory, has been commissioned by the Emperor of Brazil to have a photographic apparatus constructed similar to that devised by the Brothers Henry at Paris, in order to co-operate with them in the proposed photographic survey of the sky.

HARVARD COLLEGE OBSERVATORY.—Prof. E. C. Pickering has issued his Report for the year 1885. As in former years, chief interest attaches to the photometric researches carried out at the Observatory. With the 15-inch equatorial the photo*metric observations of the eclipses of Jupiter's satellites have* been continued. In all, 319 eclipses have now been observed, 35 since the end of October 1884. The reduction of the photometric observations of the zone stars between the declinations +0° 50′ and +1° 0′ has been carried on, and the observations of DM. stars between + 49° 50′ and + 50° 0′, as well as those between +54° 50′ and +55° 0′, have been completed. These observations have been made with the wedge photometer attached to the large equatorial. The resulting magnitudes have been computed by means of the stars occurring in the zones which are also under observation with the meridian photometer.

The work of the wedge has thus been made homogeneous with that of the meridian photometer. The extensive use thus made of the wedge photometer seems to show that the instrument used at Harvard College is not capable of the great degree of precision which is claimed for that employed by Prof. Pritchard. To determine whether this difference is due to the form of the instrument, Prof. Pritchard has kindly undertaken to superintend the construction of a wedge photometer made upon his plan. The number of series of observations made during the year with the meridian photometer is 202; the number of separate settings somewhat exceeding 50,000. The accordance of the results continues satisfactory; the average deviation of the separate measures of the standard circumpolar stars being 0·12 of a magnitude. The entire series of stars to be observed with this instrument includes zones at intervals of 5° from the equator to the pole; the system adopted insuring a regular distribution of stars down to the ninth magnitude. An important investigation has also been undertaken in stellar photography. A Voigtlander portrait lens of 8 inches aperture and 44 inches focus has been mounted equatorially, and with this many photographs have been taken of the trails left by a star when the telescope is not driven by clockwork, polar stars as faint as the fourteenth magnitude and equatorial stars of the sixth magnitude having been thus photographed. Some most striking results have been obtained with stellar spectra. By placing a large prism in front of the lens, photographs have been obtained of stars as faint as the eighth magnitude, in which lines are shown with sufficient distinctness to be clearly seen in a paper positive. As all the stars in a large region are thus photographed, more than a hundred spectra have been obtained on a single plate.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1886 *FEBRUARY* 21-27

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on February 21

Sun rises, 7h. 4m.; souths, 12h. 13m. 48·0s.; sets, 17h. 24m.; decl. on meridian, 10° 28′ S.: Sidereal Time at Sunset, 3h. 30m.

Moon (at Last Quarter on Feb. 25) rises, 20h. 2m.*; souths, 2h. 17m.; sets, 8h. 19m.; decl. on meridian, 0° 22′ S.

Planet	Rises h. m.	Souths h. m.	Sets h. m.	Decl. on meridian ° ′
Mercury ...	7 13 ...	12 7 ...	17 1 ...	13 17 S.
Venus ...	6 1 ...	11 45 ...	17 29 ...	3 51 S.
Mars ...	18 48* ...	1 29 ...	8 10 ...	7 24 N.
Jupiter ...	20 13* ...	2 15 ...	8 17 ...	0 22 S.
Saturn ...	11 49 ...	20 0 ...	4 11* ...	22 44 N.

* Indicates that the rising is that of the preceding evening and the setting that of the following morning.

Variable-Stars

Star	R.A. h. m.	Decl. ° ′			h. m.	
U Cephei	0 52·2 ...	81 16	N. ...	Feb. 21,	21 38	*m*
				,, 26,	21 17	*m*
Algol	3 0·8 ...	40 31	N. ...	,, 23,	5 47	*m*
				,, 26,	2 35	*m*
λ Tauri	3 54·4 ...	12 10	N. ...	,, 22,	20 28	*m*
				,, 26,	19 20	*m*
ζ Geminorum ...	6 57·4 ...	20 44	N. ...	,, 27,	21 30	*m*
U Monocerotis ...	7 25·4 ...	9 32	S. ...	,, 25,		*m*
S Cancri	8 37·4 ...	19 27	N. ...	,, 26,	1 54	*m*
W Virginis	13 20·2 ...	2 47	S. ...	,, 25,	5 0	*M*
δ Libræ	14 54·9 ...	8 4	S. ...	,, 25,	23 2	*m*
U Coronæ	15 13·6 ...	32 4	N. ...	,, 26,	22 30	*m*
U Ophiuchi	17 10·8 ...	1 20	N. ...	,, 21,	3 55	*m*
		and at intervals of			20 8	
W Sagittarii ...	17 57·8 ...	29 35	S. ...	Feb. 24,	2 30	*m*
β Lyræ	18 45·9 ...	33 14	N. ...	,, 21,	2 30	m_2
				,, 24,	7 0	*M*
R Lyræ	18 51·9 ...	43 48	N. ...	,, 25,		*M*
δ Cephei	22 24·9 ...	57 50	N. ...	,, 24,	0 0	*m*

M signifies maximum; *m* minimum; m_2 secondary minimum.

Mira Ceti, R.A. 2h 13·6m., Decl. 3° 30′ S., should arrive at maximum about this time, but there seems a little uncertainty as to the precise date. It is possible that it has already passed the maximum. Its spectrum should be examined whilst it remains bright.

Occultations of Stars by the Moon (visible at Greenwich)

Feb.	Star	Mag.	Disap. h. m.	Reap. h. m.	Corresponding angles from vertex to right for inverted image ° °
21 ...	Uranus ...	... — ...	5 53 ...	6 34 ...	51 334
23 ...	κ Virginis...	... 4½ ...	1 3 ...	1 20 ...	325 298
25 ...	49 Libræ ...	... 5½ ...	2 13	near approach	313 —

Feb.	h.	
21 ...	2 ...	Jupiter in conjunction with and 0° 8′ south of the Moon.
24 ...	16 ...	Mercury in superior conjunction with the Sun.

GEOGRAPHICAL NOTES

LIEUT. WISSMANN, who was on his way back to Europe from his last great journey in the Congo district, stopped at Madeira for the benefit of his health, and has now returned to Africa for further explorations. Lieut. von François, who took part in Lieut. Wissmann's expedition on the Kassai River, has returned to Brussels. He reports that on June 16, 1884, he started with Wissmann from Malange to the Lulua River; thence Wissmann turned northwards and founded the station of Luluaburg, while Francois investigated the Mukenge district. As he wished to regain Wissmann he built five large boats, in which he reached Luluaburg on the Lulua. He also met Tchingenge, the chief of the Balubas tribe, and Mutenda, one of the first chiefs of the Camokas, who received him kindly. After consulting Wissmann he travelled to the Kassai, which they ascended; then, descending the Congo, they eventually reached Leopoldville, after fifty days' journey. Afterwards Francois accompanied the missionary, Mr. Grenfell, to the tributaries of the Upper Congo. They first ascended the Lulongo (on the right bank of the Congo), and then the Shuapa, which Stanley names the Uranki. The Shuapa retains its name for the whole length of its course, a circumstance which does not often occur in the Congo lands. It is a large river, navigable everywhere, with extremely fertile banks, which for objects of navigation even surpasses the Kassai. The inhabitants of Batua, on the middle Congo, are a real race of dwarfs. The men have an average height of 1·30 metres, the women of 1·10 metres; but they are well developed and very warlike. When the travellers ascended the river they were attacked by the inhabitants, while on the return journey they were very well received. They also discovered the Bussera, a tributary of the Shuapa. Further on they examined the mouth of the Mobangi, a large tributary of the Congo on its right bank. Grenfell is of opinion that the Mobangi and the Welle River, which has its sources in the Southern Soudan, are one and the same river; François, however, believes that the Mobangi is the continuation of the Nana River, situated further to the north. François states that the land of the Balubas is extremely fertile, no less than three harvests annually being the rule. When exploring the Kassai, François and Grenfell found that this river, instead of joining the Uranki (Shuapa), as Stanley supposed, flows into the Congo near Kwamouth. The Leopold Lake flows into the Kassai at a distance of about 1½° from the Congo. The Lulongo runs parallel to the Congo for a considerable distance on its northern side. The two travellers discovered numerous other smaller tributaries.

A RECENT number of *Cosmos* contains an article by M. de Morgan, who was employed by the Government of the Straits Settlements to prepare a map of the State of Perak in the Malay peninsula, on the Stone Age there. In the course of his work, the writer had to visit the range of mountains forming the watershed of the peninsula, and here came into contact with the Sakayes, Seumangs, Rayats, and other pre-Malay Negrito tribes, as nearly in their original state as they can now be found in these regions. He refers to other tribes living in recesses of the mountains, of whom he learnt from the Sakayes. The latter call them "fire apes"; their language is said to have nothing in common with Malay or Negrito dialects. M. de Morgan received here two polished stone axes, which were said to be made by the "fire apes." One was made of a fine-grained yellow porphyry, and was 224 mm. in length, 53 mm. in breadth, and 16 mm. thick; the other was of a green quartz schist, and